Space Weather Forecast

Issued on Friday, 25 November 2022 at 12:37 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Peak Chance of Minor Geomagnetic Storm (G1) intervals on Saturday (UTC).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low in the past 24 hours, with X-ray activity showing isolated common-class activity. The largest flare of the period was a small common-class flare at 25/0722UTC, emanating from a fading sunspot region in the northwest. This was one of four regions on the Sun, all simple and stable or in decay with the exception of a growing and proliferating small bipolar group in the northeast, although this growth was not capped by flares.

The main potential Coronal Mass Ejection (CME)-generating event of the period was a large but slow potential sequential filament lift-off from the south central portion of the Sun around 24/1200UTC and again between 24/1800-2100UTC. There are some early signs of ejecta leaving the Sun directed mostly to the south of the Sun-Earth line, however this will be confirmed as more imagery becomes available. At present then, there are no new Earth-directed CMEs observed in available imagery.

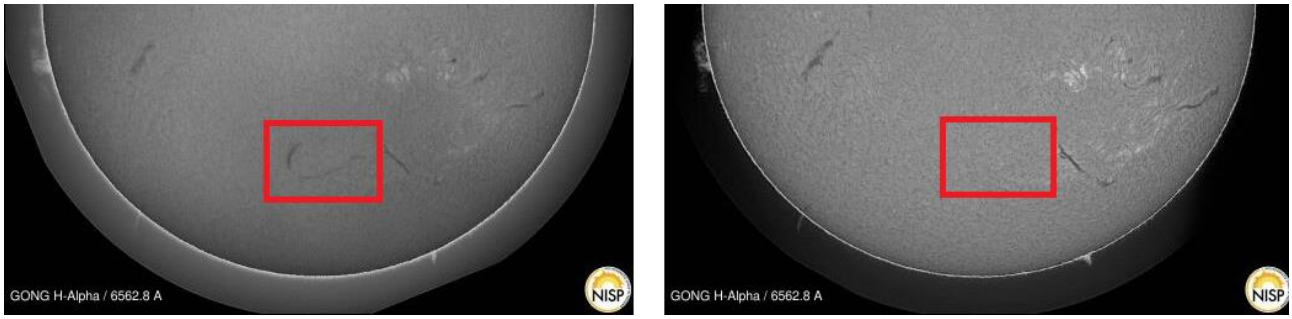

Figure 1: Near infra-red ground-based observatory imagery, immediately preceding (left) and following (right) the possible staged 'filament lift-off' from the south central portion of the Sun. While there is some ejecta visible in imagery which appears directed mostly south of the Sun-Earth line, proper analysis will be conducted when further imagery becomes available.

Solar Wind / Geomagnetic Activity: The solar wind showed a transition from a slow regime into a coronal hole high speed stream, narrowly preceded by a CIR-like environment (Co-rotating Interaction Region).

The solar wind speed rose from Background levels to become Slightly Elevated to end Thursday 24 November, with a step-wise increase observed after 25/0220UTC, with an absolute peak near Elevated levels. The number of particles in the solar wind showed a rising and then falling tendency by comparison as the CIR came and went, rising from typical background to become Elevated for a time, before reverting to its earlier tendency as the fast wind took over. The

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corresponding magnetic field associated with the particles in the wind rose from a flat background tendency to become Slightly Elevated after the change. The north-south component of the field was more erratic, being mainly co-aligned with Earth's field prior to 25/0100UTC, but switching to become more anti-aligned thereafter (to greater geomagnetic effect).

The net result of the above solar wind measures was an increase from provisionally quiet geomagnetic activity, with a peak in the 06-09UTC interval, but even this falling short of Minor Geomagnetic Storm G1.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to remain low or very low, with a chance of isolated common-class flares and a slight chance of isolated moderate-class X-ray flares. To end the four-day forecast period, new regions may rotate onto the facing side, although these are not expected to be significant.

Solar Wind / Geomagnetic Activity: Several recent CMEs occurred on or close to the Earth-Sun line which could give glancing blows on passage. Both of these possible CMEs were associated with different common-class X-ray flare events on 22 November, and both are most likely to pass beneath Earth's orbit, with the peak risk of minor peripheral impacts on Saturday 26 November.

Continuing Slightly Elevated solar winds are expected from the current coronal hole fast wind, with a chance of temporary Elevated solar wind speeds developing. Further enhancements in the solar wind are possible through the rest of the forecast period, from either the weak passing CMEs on Saturday 26 November, or from a new connection to a second fast wind stream.

There is a chance of raised geomagnetic activity in the coming three days: respectively from the current fast wind to end the UTC working week, and then lower confidence events from Saturday 26 November: up to two glancing CMEs and perhaps a resurgent fast wind from another coronal hole. Note that of these later events, the former may miss and any increase from the latter may be indistinct from the current fast wind.

The most reliably quiet conditions of the period are expected on day four, Monday 28 November. The peak risk of Minor Geomagnetic Storm G1 should occur on Saturday 26 November.

Energetic Particles / Solar Radiation: No solar radiation storms are expected given the dearth of significant sunspot regions, CMEs and flares.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	30	20	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	5	5	5	5
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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